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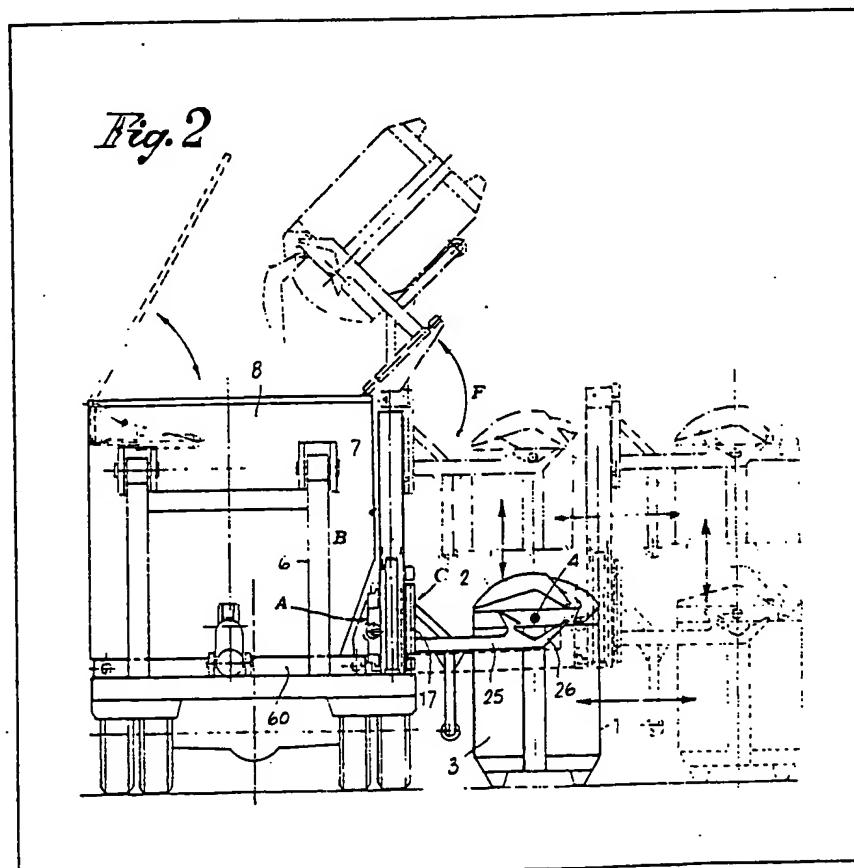
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Potts, Kerr & Co.,
15 Hamilton Square,
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Merseyside L41 6BR.(54) Vehicle with lateral equipment for
the movement of containers in general(57) A vehicle is provided with lateral
equipment for moving bins (1), for
emptying the bins into a container (8)
provided at least with compaction
equipment on board the vehicle and
possibly also equipment for washing
the bins, the said bins each having a
cover and at least two lifting lugs (4)
fixed to the tops of the sides thereof (3).
The lateral equipment (60-A-B-C) in-
cludes two lifting arms (25) which en-
gage with the lifting lugs (4) of the bin
which is to be moved. The equipment
comprises combined structures for
effecting horizontal movements in one
or more directions and vertical move-
ments for lifting the bins off the ground
up to the level of the container, as well
as angular movements for overturning
and emptying the said bins above the
said container in a transverse direction
with respect to the axis of the vehicle.

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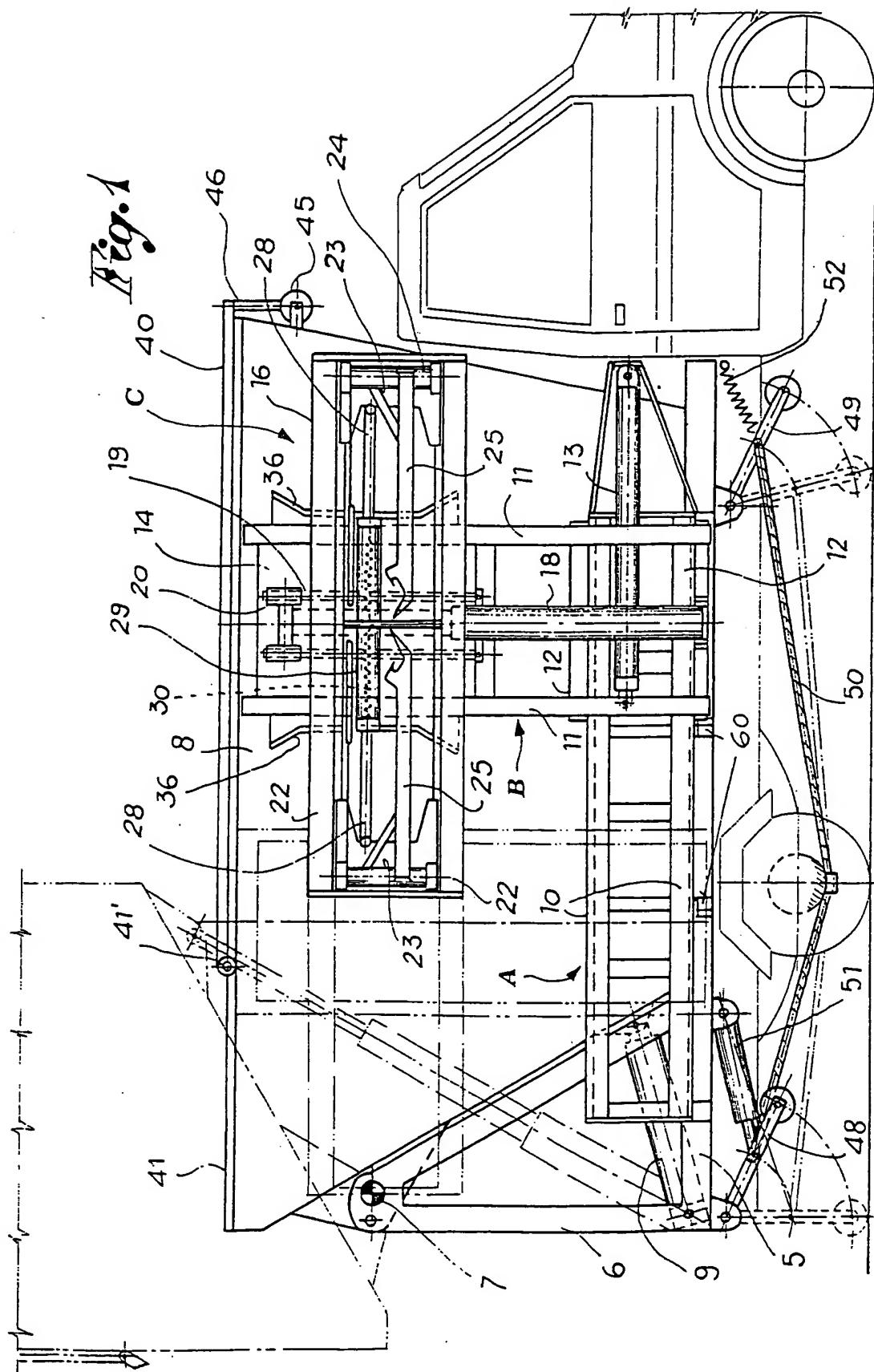


Fig. 3

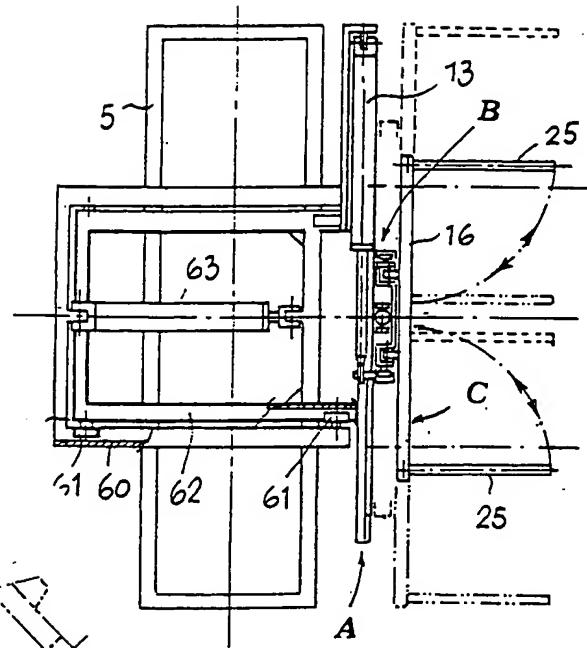


Fig. 2

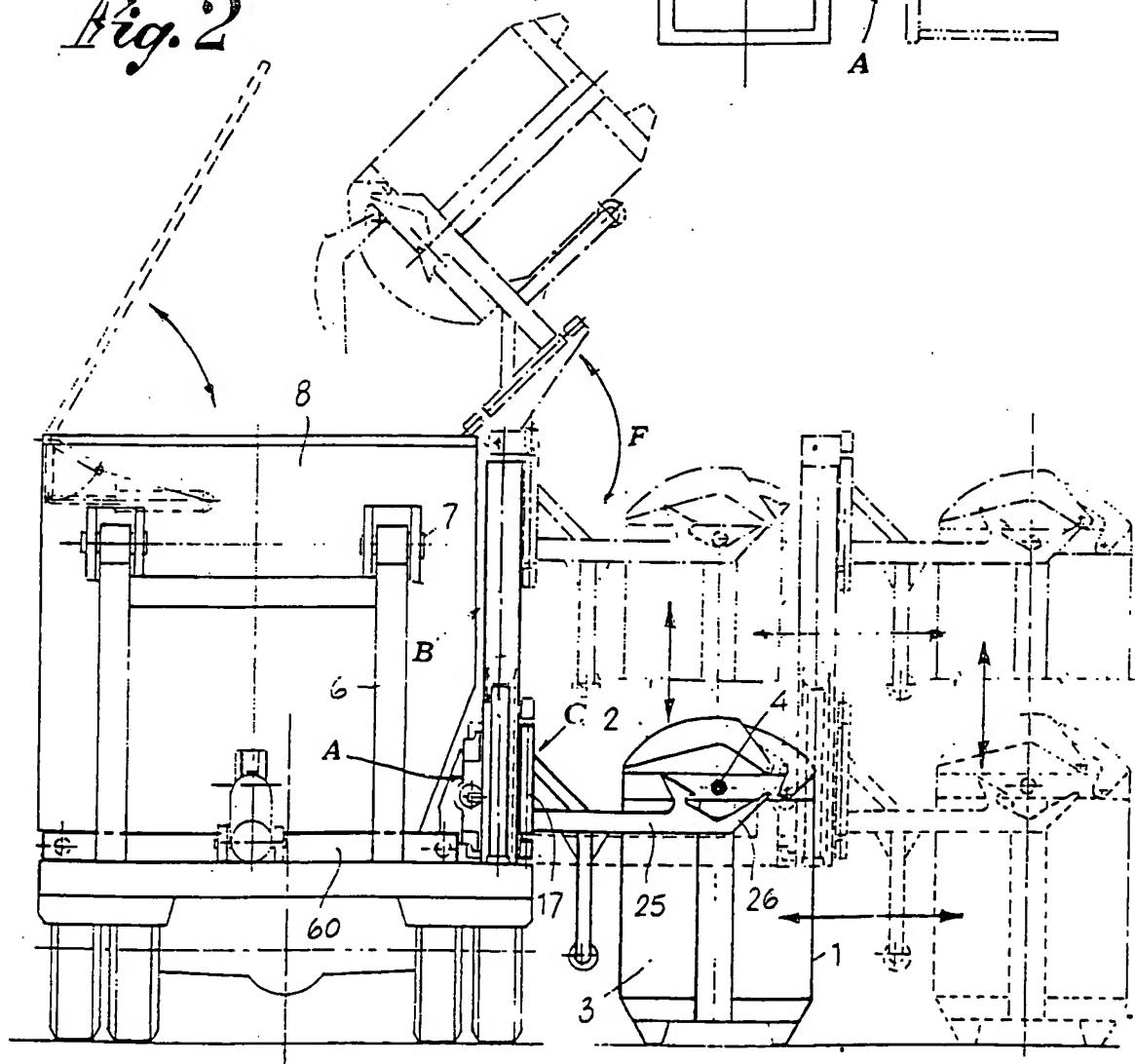


Fig. A

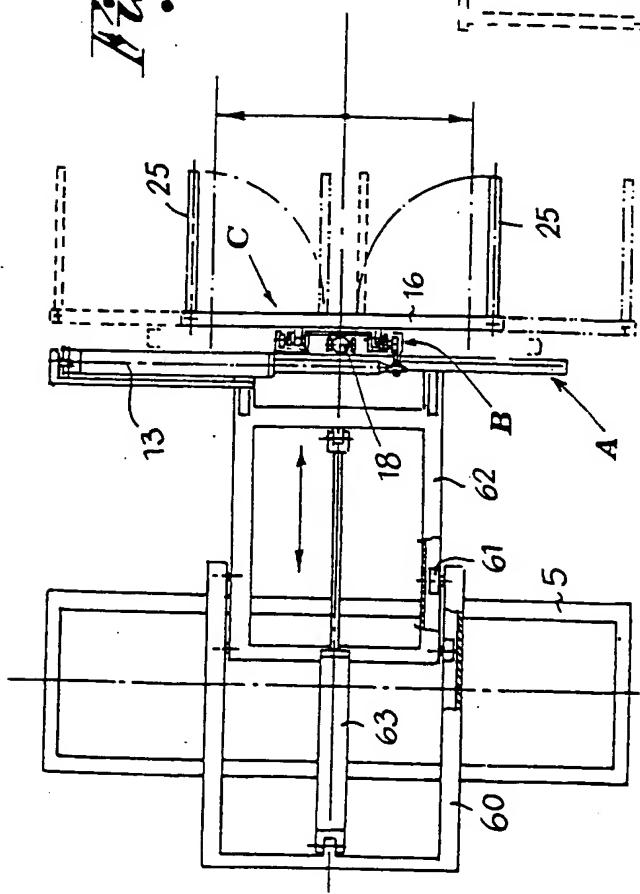
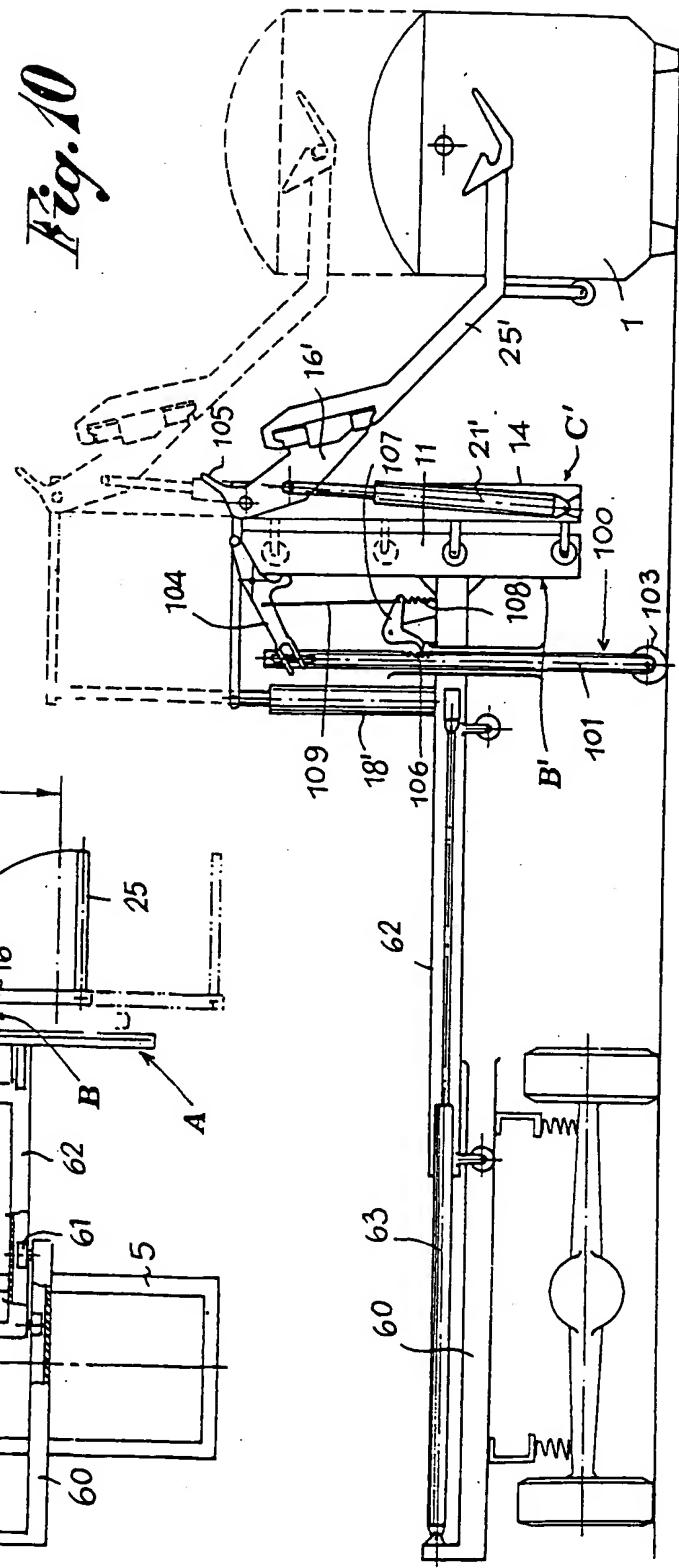
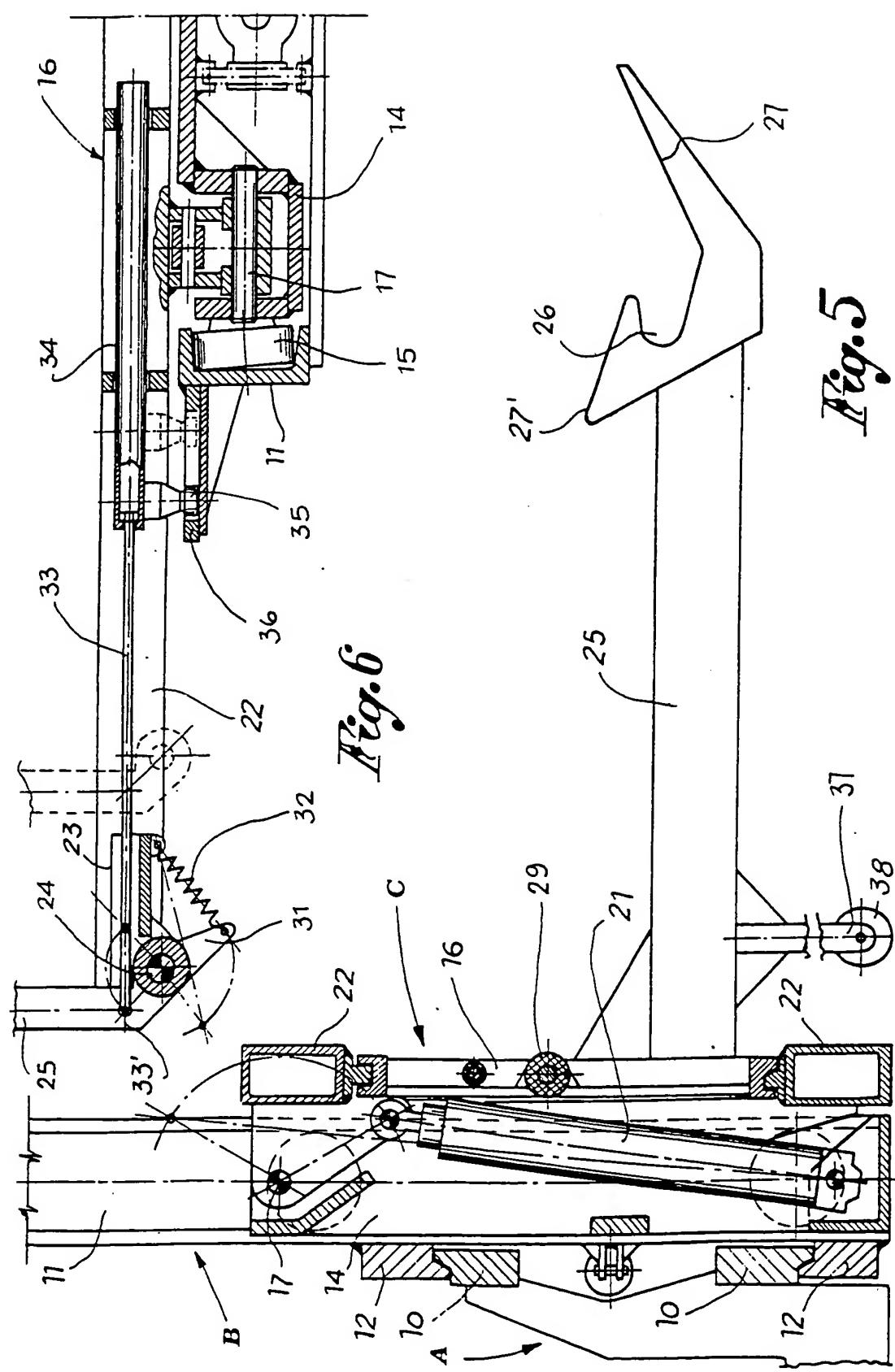


Fig. 10





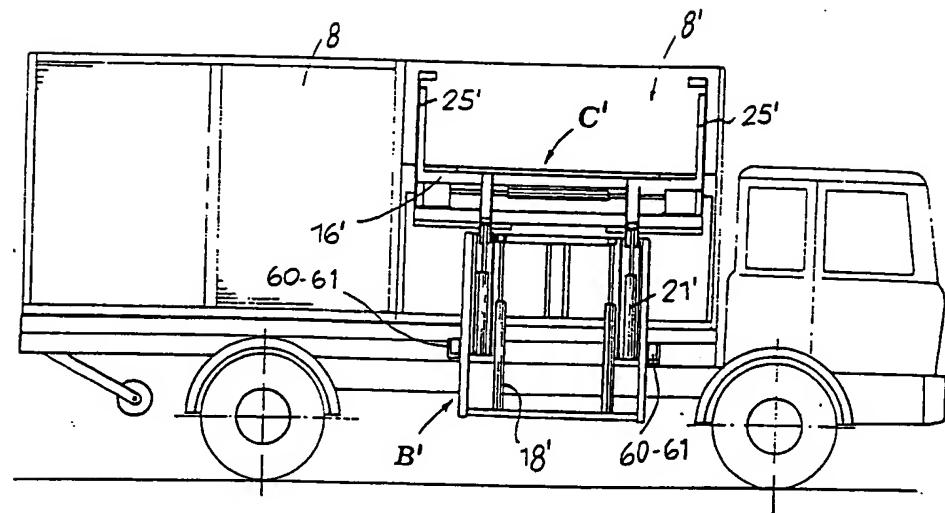


Fig. 7

Fig. 15

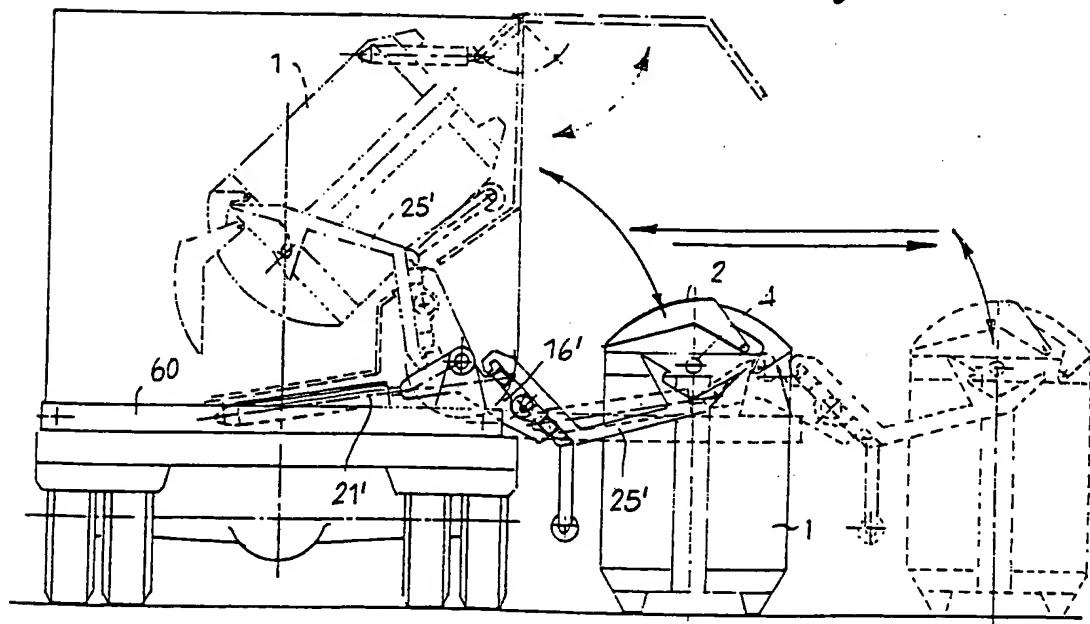


Fig. 8

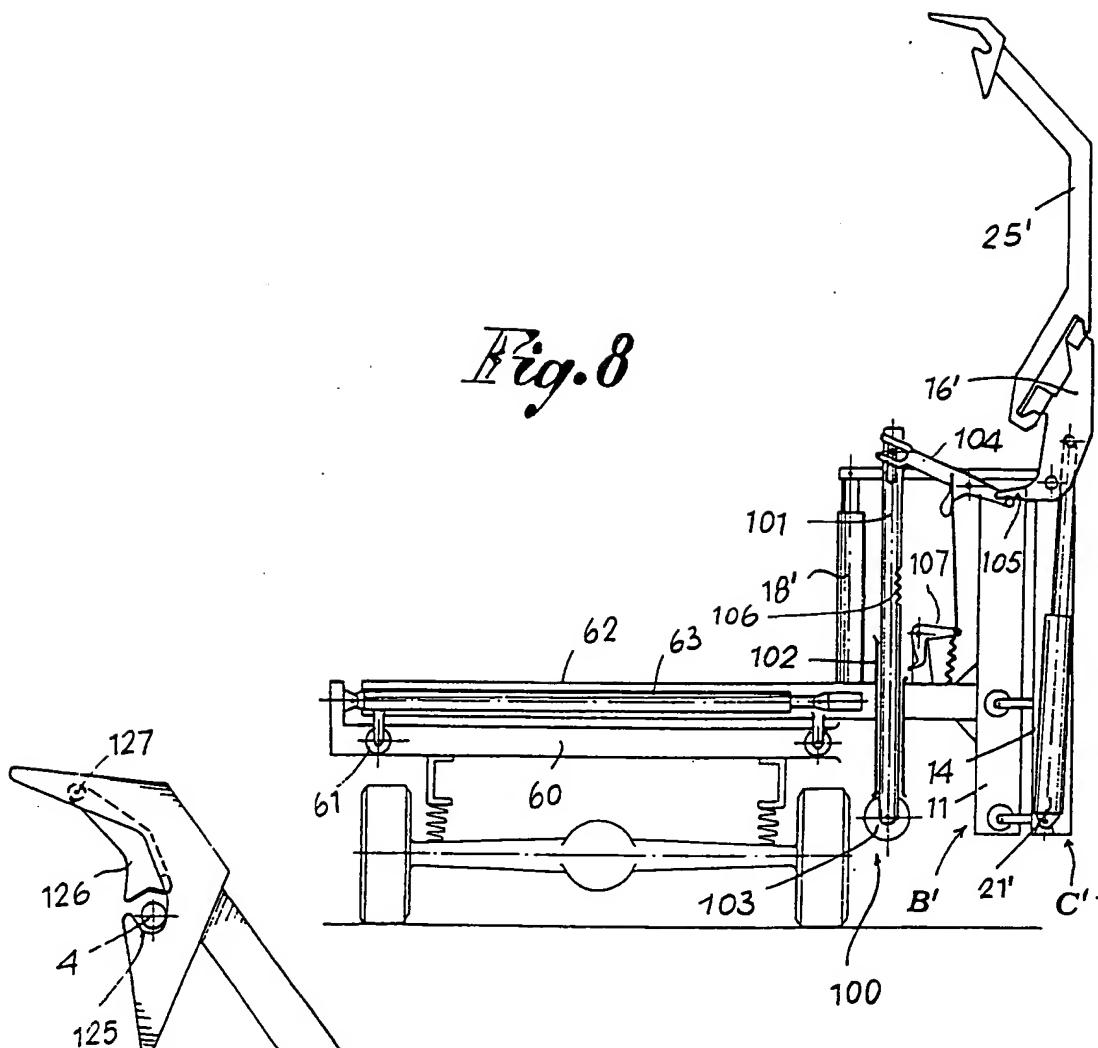


Fig. 14

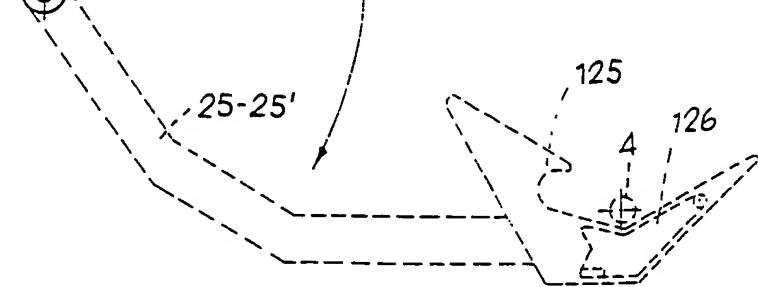


Fig. 11

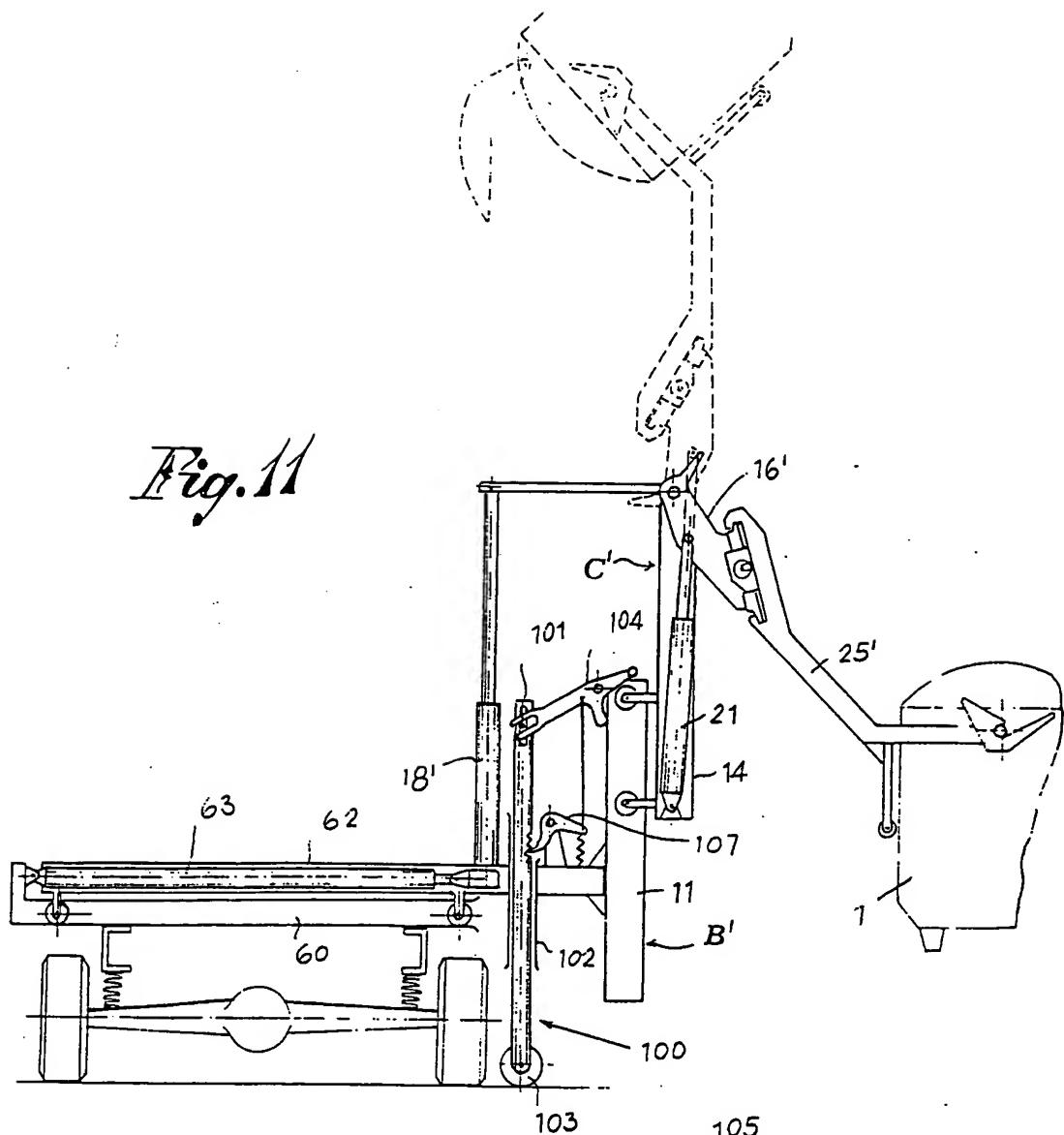


Fig. 9

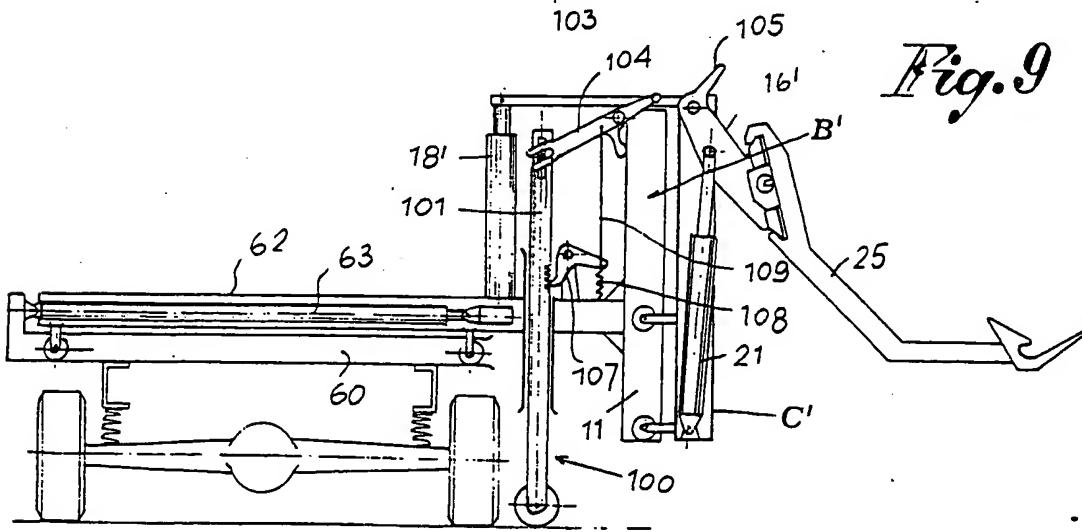


Fig. 12

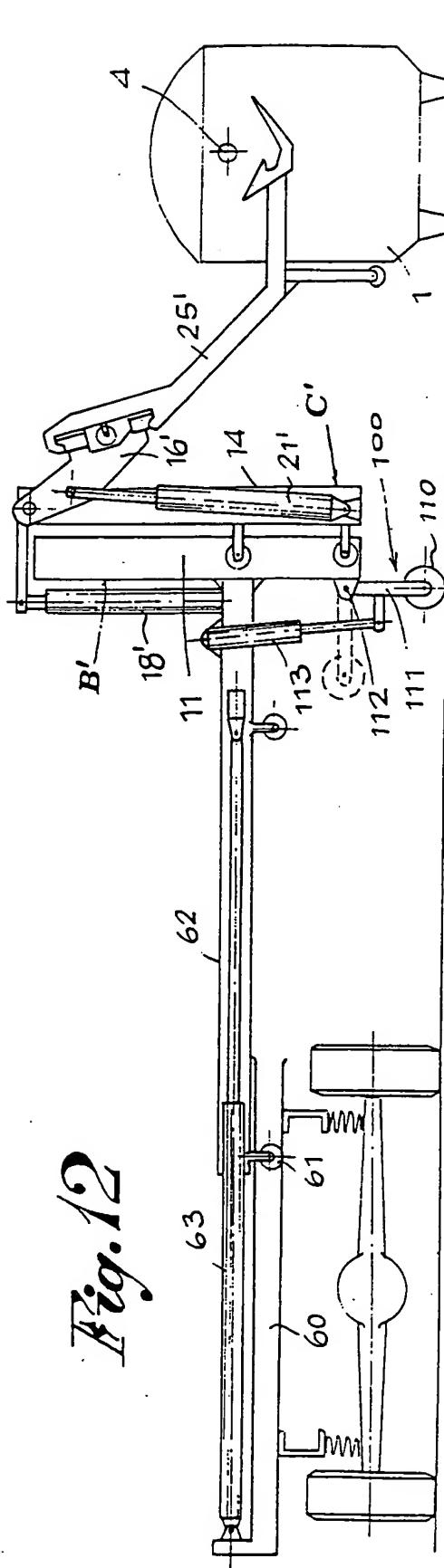
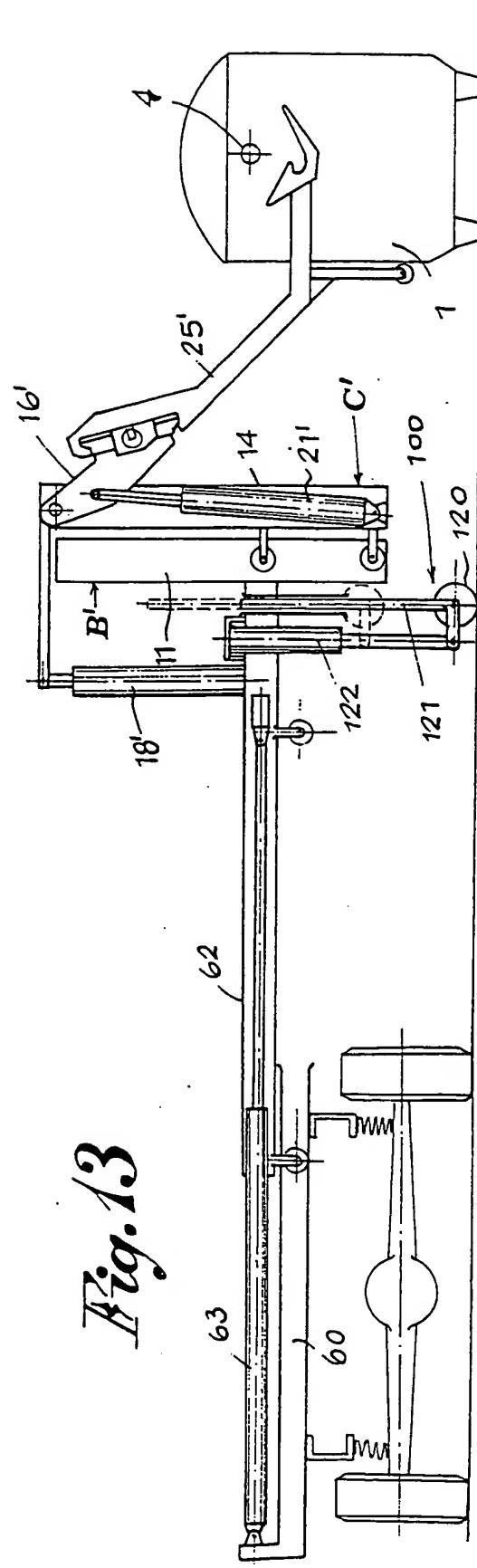


Fig. 13



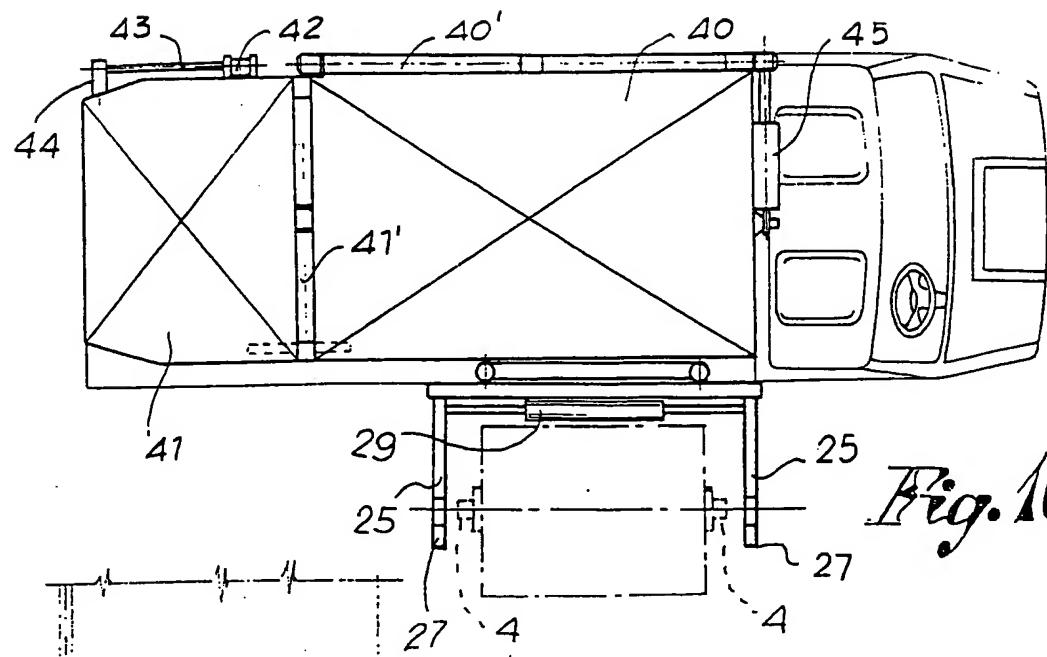


Fig. 16

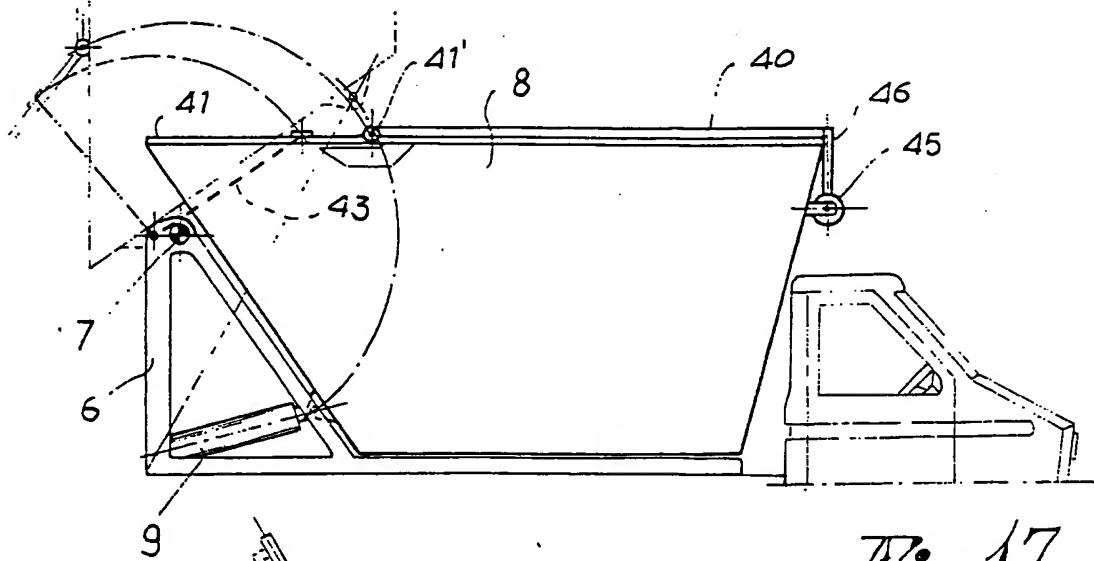


Fig. 17

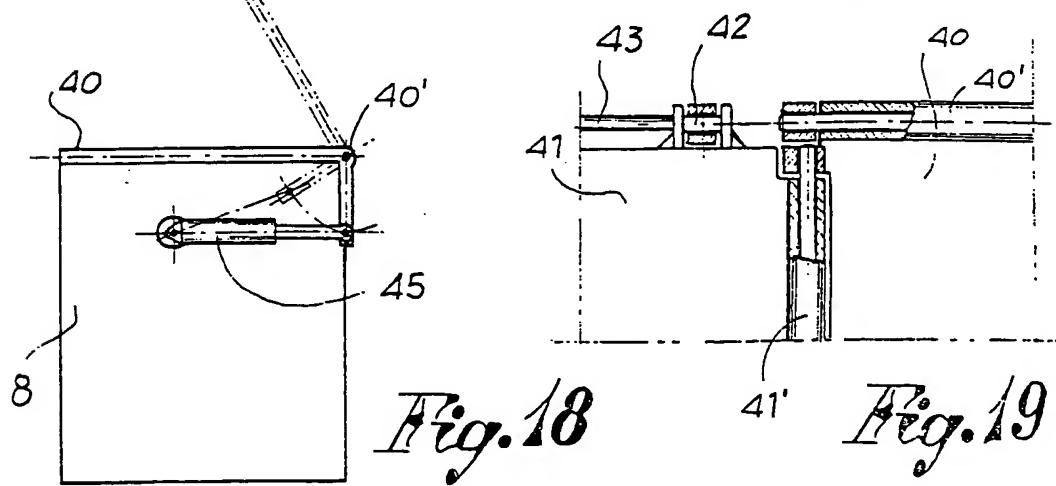


Fig. 18

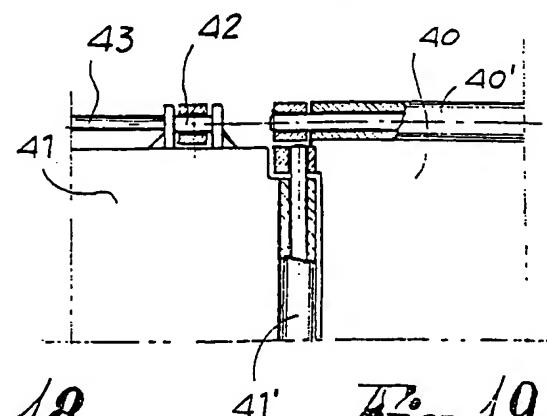


Fig. 19

SPECIFICATION

Vehicle with lateral equipment for the movement of containers in general

5 This invention relates to a vehicle with lateral equipment intended for moving containers or bins in particular, which may also but not exclusively be for the collection of rubbish, for emptying the bins into a 10 container provided on board the vehicle and possibly for washing the bins or for other operations relating to the bins themselves.

The use of bins which can be placed in the street alongside pavements, alongside buildings or in 15 more appropriate and accessible places for the users disposing of rubbish is now widespread in the collection of rubbish, waste materials or the like.

In parallel with the use of these bins various forms of equipment have been developed which are able to 20 lift the bins off the ground, overturn or invert them in order to empty them and replace them on the ground. The vehicle may be a self-compacting truck or similar, but has the disadvantage that the bins have to be placed on and removed from the lifting 25 and emptying equipment by hand in tiring and heavy work.

Proposals have also been made for vehicles equipped with devices which can pick up a bin from the ground, hold it while it is carried to a collecting 30 container, skip or compactor, invert it in order to empty it and again move it and deposit it on the ground in a predetermined place.

Known equipment of this type can be used to effect the operations of picking up, inverting and 35 redepositing the bin at the rear of the vehicle. Other known devices on the other hand allow all the operations of picking up, overturning and redeposition to be carried out at the side of the vehicle for better visual control of such operations.

40 Yet other devices are designed to pick up and redeposit the bin on one side of the vehicle, while the bin is inverted in order to empty it at the rear of the vehicle.

All the abovementioned devices however have in 45 common the disadvantage that they can only move one bin at a time, that they have considerable periods of idleness and that their productivity is therefore low.

In fact the idle times due to the transport of each 50 bin from the point where it is picked up off the ground to the place where it is emptied and vice versa has a major effect on the times required for the other stages, the more so the greater the distance between the bins which have to be picked up and the 55 place where they are emptied.

An attempt to overcome the above disadvantages, and thus increase productivity in the movement of bins for the collection of rubbish or waste, has been made by equipping the transport vehicle in such a 60 way that the latter can accept and transport more than one bin at any one time. Although this only results in a small reduction in the idle times resulting from transport there are however other advantages relating to the operations of emptying into the 65 compactor or container which cannot be entirely

automatic and require the intervention of manual labour.

The known devices also have limitations on their use in that they can only pick a bin up from the ground when the vehicle and therefore the equipment are properly located alongside the bin, a condition which cannot always be fulfilled especially if the bin is situated on a pavement or between parked cars and when the vehicle with the equipment is a lorry of large dimensions which cannot therefore be easily manoeuvred alongside the bin.

On the basis of the above, it is an object of the present invention to produce a vehicle for bins which is provided with equipment for picking up and 80 emptying the bins without the need for transporting them and without the need for any manual action upon them.

Another object of the invention is to produce a complex unit which can be used for automatically 85 loading rubbish or waste already collected in bins by lifting a bin off the ground and inverting it in order to empty it followed by immediate deposition of the bin in the place from which it was taken, these operations being capable of being carried out on one side 90 of the vehicle or of the container on board the vehicle.

In this way, if the vehicle is provided with a container of sufficient and large capacity, and perhaps also provided with means for compaction, 95 the rubbish placed in a plurality of bins may be loaded in succession into the one vehicle by mechanical and completely automatic means, each bin being approached directly and being replaced on the ground immediately after emptying, with the advantage of eliminating the stages of moving each bin and drastically reducing idle times.

A further object of this invention is to propose a vehicle for bins equipped with means for moving bins which is capable of movements in various 105 directions including horizontal movements in a direction transverse to the longitudinal axis of the vehicle. In this way the equipment can be moved so as to project laterally, first to pick up bins situated at a distance from the vehicle and then to replace the 110 bins on the ground in the place from which they were taken.

According to the present invention there is provided a vehicle with lateral equipment for the handling of containers or bins, for emptying the 115 containers or bins into a main container provided with at least means of compaction on board the vehicle and possibly with means for washing the containers or bins, the said containers or bins each having a cover and at least two lifting lugs fixed in 120 the upper region of its side walls, which equipment, located on one side of the main container, includes two lifting arms capable of engaging with the lifting lugs of the container or bin which is to be moved, said equipment being capable of horizontal movements in one or more directions and of vertical 125 movements in order to pick up a container or bin from the ground and raise it to the level of the main container, as well as angular movements for inverting and emptying the said container or bin above the 130 main container in a direction which is transverse

with respect to the axis of the vehicle.

The present invention will be further illustrated, by way of example, with reference to the accompanying drawings, in which:

- 5 *Figure 1* is a side view of a vehicle with lateral equipment for the handling of bins;
- 10 *Figure 2* is a rear view of the vehicle, and with dashed lines indicating the sequence of movements of the bin;
- 15 *Figures 3 and 4* show diagrammatically, in plan, two different positions of use of the equipment;
- 20 *Figure 5* is a partial vertical section of the equipment according to *Figure 1*;
- 25 *Figure 6* is a partial horizontal section of the equipment according to *Figure 1*;
- 30 *Figure 7* is a structural variant of the equipment in which provision is no longer made for movement thereof parallel to the axis of the vehicle;
- 35 *Figures 8, 9, 10 and 11* show a sequence in the operation of the equipment, complete with means of support and guidance on the ground, viewed from the rear of the vehicle;
- 40 *Figures 12 and 13* show other variants of the means of support and guidance on the ground;
- 45 *Figure 14* is a detail of a lifting arm;
- 50 *Figure 15* is another variant of the equipment which is only capable of transverse and inverting movements, but which cannot be moved vertically;
- 55 *Figure 16* is a diagrammatic view from above of a vehicle complete with the equipment;
- 60 *Figure 17* is a side view of the single upendable container on the vehicle in its horizontal position, and with dashed lines in its upended position;
- 65 *Figure 18* is a view of the end of the container with means for the control of its lid; and
- 70 *Figure 19* is a detail, in section, of the lid or container.

As illustrated, a container or bin 1, e.g. for the collection of rubbish, is fitted in a known way with a lid 2 and at the top of each side 3 with at least one lifting lug 4 for lifting and inverting the bin by means of the equipment provided on the vehicle constituting the object of this invention, the said vehicle being a lorry or truck.

- 75 The rear of the vehicle is provided with a frame 6, at the top of which a main container or skip 8 of suitable capacity pivots about an axis 7, which is transverse with respect to the axis of the vehicle. The main container 8 can, for example, be tipped towards the rear of the vehicle by rotation about the pivotal axis 7, and for this purpose it is acted upon by a piston 9 which is capable of moving the main container 8 from a horizontal position where it rests on the frame 5 of the vehicle into an almost vertical position in order to empty it.
- 80 On one side of the container or skip 8, preferably on the right hand side with respect to the direction of movement of the vehicle, is fitted the equipment for handling the containers or bins 1, said equipment comprising a first structure A which extends horizontally, a second movable structure B which extends vertically and can move along the said first structure, and a third movable structure C which extends horizontally and can be moved vertically on the said first movable structure B, the said complex of

structures being also capable of movement in a direction transverse to the longitudinal axis of the vehicle so as to be moved a distance away from and brought close to the side of the vehicle from which it operates.

More specifically, structure A includes for example a pair of horizontal guides 10 separated vertically and parallel to the longitudinal axis of the vehicle and, therefore, of container 8.

- 85 In accordance with the invention, the said structure A is fixed to a frame 62 which is guided by means of rollers 61 along the pair of beams 60 fixed transversely to the frame 5 of the vehicle. At least one piston 63, intended to move the frame itself and, therewith, the entire equipment A-B-C along the transverse guides 60 so as to move the handling equipment and thus the bin away from and towards the side of the vehicle, is attached to frame 62.

Instead of using straight beams, the equipment may also be moved in a transverse direction by means of an angular movement on the frame of the vehicle or by means of beams connected as a parallelogram or by any other suitable means without going beyond the scope of the invention.

- 90 For its part, the second movable structure B comprises two uprights 11 which are connected together and fixed to a pair of slide units 12 which are guided slidably on and along the horizontal guides 10 of the first structure A. The said movable structure B can be moved and positioned along the guides 10 and therefore at the side of the container 8 by means of a piston 13 which is fixed at one end to structure A and connected at the other end to the said structure B.

- 95 100 In turn, the third movable structure C includes a slide 14 which is guided by rollers 15 or appropriate means along the uprights 11 of structure B and an invertible frame 16 which is pivoted on the said slide 14 by means of pivots 17 and is capable of angular movements in accordance with the arrows F in *Figure 2*.

The slide can be moved vertically along uprights 11 by means of at least one hydraulic piston 18 with or without a cable or chain transmission 19 as shown in *Figure 1*.

- 105 110 Frame 16 can be moved vertically integrally with slide 14 and, independently of the latter, angularly from the bottom upwards and vice versa, the angular movements of the said frame 16 being powered by at least one hydraulic piston 21 provided for the purpose. Slide 14 and frame 16 can be moved jointly with structure B along the horizontal guides of the first structure A.

- 115 120 Invertible frame 16 has two horizontal guides 22, along which are guided two sliding supports bearing two corresponding lifting arms 25, both pivoted on a pivot with a vertical axis 24, which each have a hook 26 which is designed to engage the lifting lug 4 of a bin 1 and an end piece with two inclined planes 27 - 27' designed to assist engagement of the lug 4 on the bin in order to lift it. In greater detail, the two sliding supports with their corresponding arms 25 can be moved in opposite directions along the guides 22 in such a way that they can be separated or brought together so that the distance between

them can be varied.

Slides 23 are moved relative to one another by means of two opposing rods 28 - 28 in a double hydraulic piston 29 placed horizontally between the 5 two slides, the said piston being also tensioned by return springs 30 for self-centering.

Lifting arms 25 may also be folded about their corresponding pivots 24 so as to change from a working position, in which the arms are placed 10 parallel to each other and perpendicularly or squarely with respect to frame 16, to a rest position in which arms 25 are turned towards each other and placed alongside the frame as shown in Figure 1.

Each arm 25 is integral at its rear with a lever 15 portion 32 which is connected to a spring 32, which tends to hold the said arm in the working position defined above - see Figure 6.

In order to oppose spring 32, a tie rod 33, guided through a tubular portion 34 in a direction longitudinal to frame 16, is also connected to each arm at 20 33' in order to take up a position relative to the separation between the arms at any given time, without affecting the operation of the latter: A follower 35, such as for example a roller, which is 25 intended to act together with a corresponding cam guide 36, with a vertical profile fixed to structure B in order to return the arm to the rest position, is also fixed to the tubular portion 34 corresponding to each arm. In fact when the arms are fully apart the 30 followers 35 are obliged to follow the corresponding cam guides exerting a tractive force on the arms 25 through tie rods 33 in opposition to the corresponding springs 32 finally bringing them into the rest position shown in Figure 1.

35 The cam guides 36, however, have a limited vertical extent so that when structure C is moved downwards the followers 35 leave the said guides allowing arms 25 to open automatically through the action of the corresponding springs, this opening 40 manoeuvre taking place in a plane above the lid of the bin which is to be moved.

Instead of being pivoted to the inverting frame, as shown in Figures 1 and 2, so that they can be folded against the said frame while the vehicle is in motion, 45 the lifting arms 25' can be mounted slidably on the inverting frame so that they are always squarely placed with respect to the latter as shown in Figures 7 to 15.

In this way arms 25' move, together with the 50 inverting frame 16' from a horizontal position projecting from the side of the vehicle in order to pick up a bin 1 to a vertical position for inverting the bin and vice versa in addition to being able to be brought together and moved apart with respect to 55 each other in the same way as for the folding arms 25. Under all circumstances, therefore, when frame 16' is turned upwards arms 25' are turned towards the centre of the vehicle and lies within the bounds of the limiting dimensions of the vehicle so that the 60 vehicle is in a drivable condition.

Also each lifting arm 25 - 25' of the device may include, see Figure 14, a locking unit 126 associated with the corresponding socket or hook 26 receiving the lug 4 of the bin 1 which is to be moved, the 65 locking unit being hinged freely at 127 and acting

under its own gravity to open or close the said socket, depending on whether the arm is orientated horizontally or vertically.

In fact, when the lifting arm 25 or 25' is virtually 70 horizontal for lifting or placing a bin on the ground - see the dashed lines in Figure 14 - the locking unit 126 is displaced in such a way that it leaves socket 26 entirely free so that this can receive or release the corresponding lug 4.

75 When instead, the lifting arm 25 - 25' is moved upwards in order to invert the bin, the locking unit 126, which tends to maintain its own vertical position, moves so as to obstruct socket 26 thus preventing the lug located in the said socket from 80 being released accidentally and thus preventing the bin from falling while it is being emptied.

In all cases, lifting arms 25 or 25' are each fitted with a strut 37 which points squarely downwards and has an end roller 38 which is designed to act as a lever against the side of the bin 1 in order to produce an inverting movement while the latter is being emptied by the upwards angular movement of inverting frame 16 of movable structure C.

In a structural variant, which does not go beyond 90 the scope of this invention, the equipment may be mounted on the vehicle without the possibility of horizontal movement parallel to the longitudinal axis of the vehicle itself, so as to remain in a stationary position with respect to the container 8, while

95 retaining the possibility of transverse, vertical and inverting movements by the means provided for picking up, lifting and emptying the bins. This is particularly convenient in the case of collection containers 8 which have a loading aperture in a

100 particular position once they have been mounted on the vehicle, such as for example in the case of containers which incorporate means for compaction or for washing.

An example of the said equipment is shown 105 diagrammatically in Figure 7 and in Figures 8 to 13 and includes, in association with a container 8, with a loading aperture 8', a structure B' fixed directly to frame 62 which can be moved along the transverse guides 60 fixed to the vehicle, a structure C' which 110 can be moved vertically along B' by means of one or more pistons 18' and an inverting frame 16' controlled by at least one piston 21' and bearing a pair of arms 25' which pick up bins which are to be moved from time to time.

115 In both the embodiment in Figure 1 and in the embodiment in Figure 7, the horizontal movements of the equipment in a direction transverse to the vehicle are also guided on the ground by means of a support 100 which is retractable and/or capable of being folded away while the vehicle is in motion.

An example of an embodiment of the said means of support 100 is shown in Figures 8 - 11 and comprises, in association with each lateral unit of the 120 movable horizontal frame 62, a strut 101 which can be moved with the said frame and guided vertically in a tubular unit 102 and is also fitted at its lower extremity with a supporting roller 103 on the ground.

At its upper end strut 101 is connected with a swinging control lever 104 which is, in turn, coordinated and engaged with a lever arm 105 provided on 125

130

the invertable frame 16 or 16' of the equipment and is intended to control the automatic extension or raising of strut 101.

The said strut 101 is also provided with a toothed portion 106 which engages a restraining pawl 107 intended to secure the strut when it is supported on the ground, the said pawl being tensioned by a spring 108 and being connected with a tie rod 109 to the swinging control lever 104. First the extension 10 and then the raising of strut 101 are effected automatically as a result of the movements of the invertable frame 16 - 16' and therefore of the lifting arms 25 or 25' from a rest position to a working position.

15 When in fact frame 16 or 16' is turned upwards and structure B or B' is moved downwards into the rest the vehicle driving position lever arm 105 acts on the corresponding swinging lever 104 so as to hold strut 101 constantly upwards as shown in

20 Figure 8.

With the rotation of invertable frame 16 or 16' into the working position, lever arm 105 moves away from swinging lever 104 so that strut 101 moves downwards until it is supported on the ground by 25 means of the corresponding roller 103.

Pawl 107, which is tensioned by the corresponding spring 108, then engages teeth 106 to hold the strut in this position.

The various notches in the teeth 106 of the strut 30 101 allow the support 100 to adjust itself to the height of the vehicle when its load or the pressure of its tyres, etc., vary.

However the strut is only supported on the ground while the equipment is in use so as to contribute 35 towards maintaining this in its correct position when it is projected from the side of the vehicle - see Figure 10 - for picking up and/or for lifting a bin and when a bin is lifted upwards or inverted for emptying after the equipment has been brought back towards 40 the vehicle - see Figure 11.

Only when the invertable frame 16 or 16', and with this the lifting arms 25 or 25', are placed in the rest and vehicle driving position shown in Figure 8 is the strut lifted from the ground under the action of lever 45 arm 105 which acts on the swinging lever 104.

Another example of an embodiment of the means of support 100 for guidance of the equipment on the ground when it is projected is shown in Figure 12 and comprises a roller 110 on each side of frame 62 50 and/or structure B or B', which roller is supported on a support 111 pivoted about 112 which can be displaced angularly from an almost vertical position for supporting roller 110 on the ground to a position in which the said roller is raised.

55 A piston 113 is provided for the said movements of support 111 with roller 110 and is suitably activated so that the roller is supported on the ground only when the equipment is in use.

In another variant, shown in Figure 13, the ground 60 support means 100 comprises a roller 120 supported by a strut 121 which is guided vertically and is displaceable by means of a piston 122 supplied so as to support the roller on the ground while the equipment is in use and to raise the said roller off the 65 ground when the vehicle is in motion or whenever

the equipment is in its resting position.

The container or skip 8 mounted on the vehicle may advantageously be provided with a cover comprising two components of which a first component 40 covers the greater part of the length of the container from its forward end and a second component 41 covers the remaining rear portion of the container from which the material is discharged. The first component 40 of the cover is hinged with a hinge 40' along the top of the longitudinal side of container 8 on the side opposite to that on which the bin handling equipment is mounted. The second component 41 of the cover is hinged with a hinge 41' orientated transversely to the container, at the end 70 adjacent to the first component 40, and one side of it is connected by means of a pivot 42 to the upper end of a strut 43, the opposite end of which is pivoted about a pivot 44 on a mounting 6 provided on the load-bearing frame 5 of the vehicle. It should be 75 noted that when the two components of the cover are in the position where the container is closed the axis of hinge 40' of the first component 40 and the axis of pivot 42 connecting strut 43 to the second component are in line or coaxial - see Figure 1 and 80 19.

For its part, pivot 44, which secures strut 43 to mounting 6, is located eccentrically with respect to the axis of rotation of the container in order to upend it. It follows that the two components 40 - 41 forming 85 the cover can be displaced jointly in order to open or close container 8 by rotation of the former about the coincident axes of hinge 40' and pivot 42 without strut 43 having any effect on the second component of the cover. These displacements are achieved for 90 example by means of a piston 45, connected to an arm 46 which is connected to component 40 of the cover - see Figures 16, 17 and 18 - the control of this piston being independent of or dependent on the movements of the rubbish bin handling equipment.

100 105 Also, when container 8 is upended and the first component of the cover remains in the closed position, the second component 41 can rotate about its corresponding hinge 41' in order to open the corresponding part of the container and allow the 110 material to be discharged. This movement of the second component of the cover is controlled by strut 43 which is constrained to rotate about its corresponding pivot 44 describing an arc of a circle which tends to remove this component from the container 115 as shown in Figure 17 because of the eccentricity of the said pivot with respect to the axis of rotation of the container.

It should be noted, finally, that the vehicle and in particular the load-bearing frame 5 may be associated with means of stabilisation designed to be supported on the ground while the equipment is in use in order to stabilise the whole and designed to be raised while the vehicle is in motion. In the embodiment shown in Figure 1, these stabilisers 120 comprise at least one pair of feet or supports 48 - 49 pivoted below frame 5 and connected by a tie rod 50. One of the two feet or supports is engaged by a piston 51, by means of which and through tie rod 50 it is possible to move and hold both the feet or 125 130 supports into a supporting position on the ground in

order to stabilise the whole arrangement. It is preferably arranged that the foot controlled by the tie rod is inclined when it is in its operating position so as to favour the automatic return of the said foot 5 to its resting position by means of a return spring 52 once the force from the piston has ceased.

An embodiment of the equipment as shown in Figure 7, which may also be without means which are vertically adjustable (structure C'), as shown in 10 Figure 15, is also suitable for the operation of washing bins in addition to being suitable for lifting and inverting bins in order to empty the material contained within them into a container. In this case the equipment is associated with a container 8" 15 which incorporates means for washing.

The operating cycle of the unit described comprises lifting one container at a time from the ground, raising it and inverting it in order to discharge the material into a container 8 on the vehicle and 20 subsequently redepositing the empty bin on the ground in the same place from which it was taken.

In order to lift bin 1 from the ground, the vehicle is brought alongside bin 1 while the handling equipment is positioned with the corresponding movable 25 structure C moved upwards and the lifting arms 25 folded into the rest and driving position.

Thus, once the stability of the whole arrangement has been assured by the support of stabilisers 48 - 49 on the ground, the various parts of the equipment 30 are adjusted by a suitable control, arms 25 or 25' approach the bin in order to pick it up, raise it and invert it in order to empty it as illustrated.

As the equipment is mounted on the side of the vehicle, it is possible to pick up and move a bin 35 which has been placed on the ground even at some distance from the vehicle, within the range of the maximum reach obtainable. As a result, the use of the equipment to move bins which are placed along a road and/or pavements, which are now not always 40 accessible, is functionally effective, practical and versatile.

Finally it is obvious that several bins or containers 1 may be picked up and emptied in succession without the need to transport them until such time as 45 the container or skip on the truck is filled.

CLAIMS

1. A vehicle with lateral equipment for the handling of containers or bins, for emptying the containers or bins into a main container provided with at least means of compaction on board the vehicle and possibly with means for washing the containers or bins, the said containers or bins each having a cover 50 and at least two lifting lugs fixed in the upper region of its side walls, which equipment, located on one side of the main container, includes two lifting arms 55 capable of engaging with the lifting lugs of the container or bin which is to be moved, said equipment being capable of horizontal movements in one or more directions and of vertical movements in order to pick up a container or bin from the ground and raise it to the level of the main container, as well 60 as angular movements for inverting and emptying 65 the said container or bin above the main container in

a direction which is transverse with respect to the axis of the vehicle.

2. A vehicle with lateral equipment as claimed in claim 1, in which said equipment additionally comprises a first structure having at least one pair of horizontal guides parallel to the longitudinal axis of the vehicle, a second movable structure which extends vertically and is capable of being moved and positioned along the horizontal guides of the said 70 first structure, and a third movable structure which extends horizontally and is capable of being moved vertically on the said second movable structure, in which the said first structure is fixed to a horizontal movable frame guided and movable along guidance means fixed to the frame of the vehicle so that the equipment can be moved away from and towards the side of the vehicle itself, and in which the said 75 third movable structure comprises a slide which can be moved only vertically along the second movable structure and an invertible frame pivoting on a horizontal axis provided on the said slide and capable of vertical movements with the said slide and of angular movements about the said axis independently of the said slide, the lifting arms for 80 the bin being mounted on the said invertible frame.

3. A vehicle with lateral equipment as claimed in claim 1, in which said equipment comprises a first movable structure which can be moved in a vertical direction and a second movable structure which 85 extends horizontally and can be moved vertically on the said first movable structure, in which the said first structure is fixed to a horizontal movable frame which is guided and can be moved along guidance means fixed to the frame of the vehicle so that the equipment can be moved away from and towards the side of the vehicle itself, and in which the said 90 third movable structure comprises a slide which can be moved only vertically along the first movable structure and an invertible frame pivoted on a horizontal axis provided on the said slide which is capable of vertical movements with the said slide and of angular movements about the said axis independently of the said slide, the lifting arms for 95 the bin being mounted on the said invertible frame.

4. A vehicle with lateral equipment as claimed in claim 1, in which the said equipment comprises a structure which extends horizontally and includes a slide which can only be moved vertically along the first movable structure and an invertible frame 100 which is pivoted about a horizontal axis provided on the said slide which is capable of vertical movements with the said slide and of angular movements about the said axis independently of the slide, the lifting arms for the bin being mounted on the said invertible frame. 105

5. A vehicle with lateral equipment as claimed in claim 1, in which said equipment comprises a structure fixed to the load-bearing frame and having at least one pair of horizontal guides parallel to the 110 longitudinal axis of the vehicle, a first movable

130

structure which extends vertically and can be moved and positioned along the horizontal guides of the said fixed structure, and a second movable structure which extends horizontally and can be moved

5 vertically on the said first movable structure, the said second movable structure comprising a slide which can be moved only vertically along the first movable structure and an invertible frame pivoted about a horizontal axis to the said slide and capable of

10 vertical movements with the said slide and of angular movements about the said axis independently of the slide, the lifting arms for the bin being mounted on the said invertible frame.

6. A vehicle with lateral equipment as claimed in

15 claim 1 and in any one of claims 2 to 5, in which the said lifting arms are pivoted on pivots with a vertical axis on two corresponding slide supports which can be moved horizontally in opposing directions on the invertible frame of the horizontally-extending mov-

20 able structure, the said arms being capable of being folded about their relative pivots to move from a working position in which the said arms are positioned parallel to each other and perpendicular to the said invertible frame to a resting position in

25 which the arms are folded towards each other and lie alongside the said frame.

7. A vehicle with lateral equipment as claimed in

claim 6, in which each lifting arm is stressed in one direction by a spring which tends to hold it in the

30 working position and in the other direction by a tie rod connected to a follower which is designed to act together with a vertical cam guide of limited height fixed to the vertically extending movable structure, the said followers and the said vertical cam guides

35 controlling the folding of the arms into the resting position when the latter are apart and the second movable structure is moved to the level of the said guides while the said arms move into their working position under the force of the corresponding

40 springs when the second movable structure is moved below the said guides.

8. A vehicle with lateral equipment as claimed in

claim 1 and in any one of claims 2 to 5, in which the said lifting arms are fixed to the invertible frame and

45 can be moved together with the latter from a position in which they are turned outwards and project away from the vehicle to a position in which they are turned towards the axis of the vehicle so as to lie within the overall dimensions of the vehicle

50 itself.

9. A vehicle with lateral equipment as claimed in

claim 6 or 8 in which each lifting arm has a socket to take the lug of a bin associated with a swinging locking unit which is designed to close and open this

55 socket in relation to the movement of the said arm from a vertical position to a horizontal position.

10. A vehicle with equipment as claimed in

claims 6 and 8, in which each arm is fitted with a strut placed at right angles to the arm and bearing an

60 end roller intended to bear against one side of the bin while it is being inverted.

11. A vehicle with lateral equipment as claimed in

claim 1 and in any one of claims 2 to 5, in which the said movable frame is associated with one or

65 more means of support and rolling on the ground

which are retractable and/or fold away while the vehicle is in motion.

12. A vehicle with equipment as claimed in claim

11, in which each means of support comprises a

70 strut guided in a tubular unit and having a ground support roller, a swinging lever connected to the said strut and controlled by a lever arm fixed to the invertible frame of the equipment and automatically acting in concert with the swinging lever as a result

75 of the movements of the said invertible frame to give rise to two different positions, and a spring arresting pawl connected to the said swinging lever and engaging a toothed zone on the said strut in order to arrest it when it is supported on the ground.

80 13. A vehicle with lateral equipment as claimed in claim 11, in which each means of support includes a roller carried on a support which can be moved angularly from a substantially vertical position in which it is supported on the ground to a substantial-

85 ly horizontal raised position, the said support being controlled by a piston.

14. A vehicle with lateral equipment as claimed in

claim 1 and in any one of claims 2 to 5, in which the frame of the vehicle is associated with means of

90 stabilisation comprising at least one pair of pivoted feet or supports with the possibility of movement from one approximately vertical position to a horizontal position, the said two feet being connected with a tie rod so as to move together into one or

95 other of these positions, the said positions being imposed by a piston acting on one of the feet or supports and, if appropriate, by a return spring connected to the other foot or support.

16. A vehicle with lateral equipment as claimed

100 in claim 1 and in any one of claims 2 to 5, in which the main container includes a cover consisting of two components of which a first component is hinged along the longitudinal side of the container opposite to that on which the bin handling equip-

105 ment is mounted, and the other component is hinged at one end of the said first component, both these two components being capable of angular movement jointly about the hinge axis of the first component with respect to the container under the

110 action of a piston which acts against the said first component, the said second component being capable of angular movement independently of and with respect to the first component about the axis of the corresponding hinge, the said second component being connected by a pivot to the upper end of a strut whose opposite end is pivoted to the container, the pivoting axis of the said strut on the said second component coinciding with the hinge axis of the first component on the container while

115 the pivoting axis of the said strut on the mounting is positioned eccentrically with respect to the axis of rotation of the said container.

17. A vehicle with lateral equipment for the

handling of containers or bins, substantially as

120 hereinbefore described with reference to and as

125 illustrated in the accompanying drawings.

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